

AI-Powered Menstrual Health Tracking

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Abstract: Artificial intelligence (AI) and machine learning (ML) have improved menstrual health tracking. AI-powered menstrual health tracking systems provide personalized predictions of menstrual cycles, detect irregularities, and offer tailored recommendations. This commentary discusses physiological and psychological correlates of menstrual health and machine learning algorithms for menstrual health tracking. We highlight future research directions, including integration with wearable devices and development of personalized models. AI-powered menstrual health tracking can enhance women's health.

Keywords: Menstrual health, Artificial intelligence (AI), Women's health, Reproductive health, Menstrual cycle tracking.

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BACKGROUND

Menstrual health is a complex aspect of women's reproductive health, influenced by physiological [1-3], psychological [4], and environmental factors [5]. The menstrual cycle is characterized by hormonal fluctuations [6], cellular transformations [7], and physiological adaptations [8]. Artificial intelligence (AI) and machine learning (ML) have improved healthcare outcomes [9]. AI-powered menstrual health tracking systems analyze data to provide personalized predictions and recommendations [10]. This integration has improved menstrual health management [11]. Therefore, it is of interest to report on the current state of AI-powered menstrual health tracking.

Physiological Correlates of Menstrual Health

Menstrual health is characterized by interplay of physiological processes, primarily governed by the hypothalamic-pituitary-ovarian axis. The menstrual cycle is regulated by a balance of hormones, including estrogen, progesterone, and follicle-stimulating hormone (FSH) [5]. These hormonal fluctuations orchestrate ovulation, menstruation, and fertility.

Ovulation is initiated by a surge in luteinizing hormone (LH), triggering the release of a mature ovum from the ovarian follicle approximately 14 days prior to the onset of menstruation [6]. This process is necessary for fertility.

Menstrual bleeding, or menses, is a physiological response to hormonal changes, resulting in the shedding of the uterine lining. This process is influenced by factors including hormonal imbalances, uterine abnormalities, and lifestyle factors, which can impact menstrual health and fertility.

Psychological Correlates of Menstrual Health

Menstrual health is influenced by psychological factors. Stress and anxiety can disrupt the hypothalamic-pituitary-adrenal axis, leading to hormonal imbalances and menstrual irregularities, such as amenorrhea or dysmenorrhea.

Hormonal fluctuations during the menstrual cycle are associated with changes in mood and emotional state, including symptoms of anxiety and depression. Additionally, menstrual health can be influenced by sleep patterns and fatigue, with some women experiencing sleep disturbances, including insomnia and daytime fatigue, during the menstrual cycle.

AI-Powered Menstrual Health Tracking Systems

Artificial intelligence (AI)-powered menstrual health tracking systems employ machine learning algorithms to analyze datasets that include demographic, physiological, and psychological variables [7]. These systems generate personalized predictions and

recommendations for menstrual health management, facilitating a better understanding and regulation of menstrual cycles [8].

The key functionalities of these systems include menstrual cycle prediction, which utilizes machine learning algorithms to forecast menstrual cycles. They also detect menstrual irregularities, such as amenorrhea and dysmenorrhea, and provide personalized recommendations for dietary modifications, exercise regimens, and stress management techniques. Additionally, these systems analyze hormonal fluctuations to predict ovulation, menstruation, and fertility.

By leveraging AI and machine learning, these systems can improve menstrual health outcomes and overall well-being in women. This enables women to improve their planning and preparation for menstrual cycles, detect health issues, and create plans for managing menstrual symptoms and reproductive health.

FUTURE DIRECTIONS

Future research directions for AI-powered menstrual health tracking encompass three key areas. One area involves integrating wearable devices to enhance data collection. This integration can provide data on physiological signals, such as heart rate, body temperature, and physical activity. The additional data can improve the accuracy of prediction models for menstrual cycles, ovulation, and fertility. Wearable devices can also enable real-time monitoring of physiological signals, allowing for timely interventions for menstrual health management.

Another area involves developing personalized models to tailor predictions and recommendations. AI-powered systems can provide predictions for menstrual cycles, ovulation, and fertility, taking into account individual user characteristics, medical history, and lifestyle factors. Personalized models can also provide recommendations for menstrual health management, including dietary changes, exercise routines, and stress management techniques. These models can be updated based on user feedback and new data.

The third area involves expanding applications to address other women's health concerns. AI-powered menstrual health tracking systems can be expanded to track fertility, providing predictions and recommendations for conception. They can also be used to monitor pregnancy, providing predictions and recommendations for prenatal care and fetal health. Additionally, AI-powered systems can be used to manage menopause, providing predictions and recommendations for symptom management and hormone replacement therapy.

By exploring these future research directions, AI-powered menstrual health tracking systems can continue to improve and expand, providing support for women's health.

The integration of AI and machine learning in menstrual health tracking has implications for women's health. AI-powered menstrual health tracking systems can provide support and guidance, enabling women to take a more proactive approach to managing their menstrual health.

DISCUSSION

One of the benefits of AI-powered menstrual health tracking is its potential to improve menstrual health outcomes. By providing predictions and recommendations, AI-powered systems can help women manage menstrual irregularities, such as amenorrhea and dysmenorrhea. Additionally, AI-powered systems can facilitate detection of health issues, such as fertility problems and menstrual disorders.

Another advantage of AI-powered menstrual health tracking is its potential to enhance women's reproductive autonomy. By providing women with information about their menstrual cycles, AI-powered systems can empower women to make informed decisions about their reproductive health.

However, there are also challenges and limitations associated with AI-powered menstrual health tracking. One concern is data privacy and security. AI-powered systems require access to personal data, including menstrual cycle information and health history. Ensuring the confidentiality and security of this data is essential.

Another challenge is the potential for bias in AI-powered menstrual health tracking. AI-powered systems can perpetuate existing biases in healthcare, particularly if the data used to train the algorithms is biased or incomplete. Ensuring that AI-powered systems are designed and developed with equity in mind is crucial.

Therefore, AI-powered menstrual health tracking has the potential to improve the way women monitor and manage their menstrual cycles. However, it is essential to address the challenges and limitations associated with these systems, including data privacy and security, bias, and equity.

CONCLUSION

AI-powered menstrual health tracking can revolutionize menstrual cycle monitoring and management [10]. Machine learning algorithms provide accurate and personalized predictions and recommendations by accounting for physiological and psychological



correlates. Future research will focus on integrating wearable devices, developing personalized models, and expanding to other women's health issues.

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